

ENVIRON

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10/11/01

October 11, 2001

Mr. Mathew Ohl
U.S. EPA, HSRW-6J
77 West Jackson Blvd.
Chicago, IL 60604-3590

Re: Work Plan for Till Vapor Tracing
Enviro-Chem Superfund Site
Zionsville, IN

Dear Mr. Ohl:

This work plan provides a proposal to delineate areas of till water contamination in the remediation area¹ at the Enviro-Chem site, as well as the off-site area between the eastern remedial boundary and Unnamed Ditch. The proposed investigation methodology was discussed during our conference call on September 21, 2001 and takes into account the concerns expressed by U.S. EPA and IDEM representatives during our September 11, 2001 meeting - namely that contaminated till water may be impacting surface water quality in Unnamed Ditch, and delineation of the till water contamination would require extensive sampling coverage.

Before presenting our proposal, we believe that it may be beneficial to summarize several conclusions about the Enviro-Chem site, which we believe have been established through previous site investigations and have been agreed upon by the Trustees, U.S. EPA and IDEM:

- A heterogeneous contaminant distribution exists in the till water;
- An upward hydraulic gradient (artesian condition) exists between the till water and the underlying sand and gravel water aquifer;
- The till water predominantly resides in isolated higher permeability lenses within the low-permeability silty clay till;
- The rate of till water and contaminant movement is extremely low; and
- While a uniform hydraulic gradient does not appear to exist in the till, the on-site till water could ultimately discharge to the unnamed ditch; and

¹ Defined in this work plan as the remedial area encompassed by the existing system of SVE trenches

- In the absence of DNAPL, the contaminated zone is largely confined to the interval at or slightly below the till water interface. While this conclusion may not be fully accepted by the Agency, this issue will be addressed by the proposed investigations.

The objective is to "map out" the distribution of VOCs in the till water.

I. SUMMARY OF PROPOSED INVESTIGATION AND OBJECTIVES

As discussed with you on September 21, 2001, we propose to: (1) characterize and map out areas of remaining till water contamination by installing a series of horizontal wells beneath the on-site RCRA cap and in the area between the on-site RCRA cap and Unnamed Ditch; and (2) analyze vapor samples collected from the horizontal wells at regular intervals. The proposed scope of work includes:

- The completion of horizontal wells beneath the cap at a depth of approximately one foot above the average depth of the till water interface;²
- The installation of continuous PVC screens in the horizontal wells;
- The purging of 5 pore volumes of vapor from the well screens (or until equilibration), followed by a recovery period;
- Collection of soil gas samples at specified intervals within the screens using a pneumatic pump and sample tubing; and
- Analysis of the vapor samples in an on-site mobile laboratory to define a pattern of contamination that can be evaluated through contouring or other analytical techniques.

While the SVE system was effective in removing the contamination that resided in the unsaturated zone, we believe that the VOCs remain at or near the till water interface and continue to diffuse upward. As the horizontal contaminant gradients in the soil gas are expected to reflect localized till water contamination, the till water contamination is traceable by analyzing soil gas samples immediately above the till water interface. There are several advantages to this vapor tracing technique: (1) it will cause no disturbance of the RCRA cap; (2) it provides the ability to collect a large amount of site data in a grid pattern across the site; (3) data can be generated in the field using an on-site mobile laboratory, and (4) the horizontal wells may be used in the future in a remedial capacity, as a possible inexpensive augmentation of the existing SVE system. As discussed below, a pilot study will be conducted as the initial phase of work, consisting of the installation and sampling of a shallow and a deeper horizontal well. The pilot test will determine the validity of this approach.

² As noted below, if the pilot test indicates that vapor sampling above the till water interface is not representative, these horizontal wells may be installed at or below the till water interface. If so, the vapor sampling will be replaced by water sampling.

II. METHODS

A. Horizontal Well Installation

Approximately 14 horizontal wells will be installed across the on-site area in an east-west orientation. The wells will be spaced 30 feet apart, midway between the existing SVE trenches. In addition, one horizontal well, oriented north-south, will be installed in the off-site area between the remedial boundary and Unnamed Ditch. These 15 horizontal wells will be installed at a depth approximately one foot above the average depth of the till water interface (see Footnote 2). Figure 1 is a plan view of the proposed horizontal wells.

In addition, the pilot test will include the installation of one deeper horizontal well across the on-site area in an east-west orientation. This horizontal well will be installed mid-way between the average depth of the till water interface and the base of the till unit, immediately beneath one of the shallower horizontal wells.

All of the horizontal wells will be installed using a specialized horizontal drilling rig. The drilling rig will be set up in one or both off-site area(s) adjacent to the site remedial boundary, depending on access limitations. The drilling rig will advance a pilot hole below the RCRA cap at a 14 degree angle until a depth approximately one foot above the depth of the till water interface at that location is reached. The pilot hole will continue to be drilled horizontally to maintain this relationship to the depth of the till water across the on-site area until the opposite remedial boundary is reached. As the horizontal portion of the pilot hole is drilled, the elevation of the drill bit will be tracked using a sonde mounted on the drill bit, a hand-held receiver that identifies the location and depth of the drill bit, and pre-surveyed ground surface elevations along the horizontal well transect. Vertical or horizontal adjustments will be made, as necessary, such that the pilot hole remains on a straight horizontal line and at the pre-determined elevations.

When the opposite remedial boundary is reached, the pilot hole will be advanced to the surface at a 14-degree angle. The pilot hole drill bit will be replaced with a pull-back head that will be used to ream the pilot hole to a 4-inch diameter. As the pilot hole is being reamed during the pull back, a 3-inch diameter, schedule 40, PVC casing with an end cap will be drawn through the borehole. A 2-inch diameter casing will then be inserted into the 3-inch diameter casing and the 3-inch diameter casing will be removed. Schematic cross-sectional views of the horizontal wells are provided in Figures 2 and 3.

B. Vapor Sampling

Vapor samples will be collected from the horizontal wells at 30-foot intervals. Prior to purging the wells, a bundle of ¼-inch outside diameter polyethylene tubing sections will be inserted into each well from each end. By adjusting the lengths of the tubing sections, one section of tubing will be inserted for every 30-foot interval to be sampled. The end of each piece of tubing will be placed at the center of its corresponding 30-foot interval and the other end will extend to the well opening.

To purge the wells, one end of each of the horizontal wells will be capped and approximately five volumes of air (or until equilibration as measured by a PID) will be

purged from the opposite end of the well. The well purging will be conducted using the existing SVE blowers. Immediately after purging each well, both ends of the well will be capped.

After a recovery period of approximately 72 hours, the vapor in the wells will be sampled using the in-place dedicated polyethylene tubing and a high precision pneumatic pump. A small volume of gas, corresponding to 3 tubing volumes, will be purged from the tubing immediately prior to sampling. A vapor sample will then be collected from the tubing, upstream from the pump, using a syringe. The vapor sample will be analyzed on-site for VOCs in a mobile laboratory.

C. Till Water Sampling (Intermediate Pilot Test Well)

If the vapor samples collected from the shallow horizontal well completed for the pilot test are not representative of the subsurface water results at wells T-2A and T-1, a second horizontal pilot test well (herein referred to as the "intermediate well") will be installed slightly below the till water interface to allow for the collection of till water samples. Since this horizontal well will be slightly inclined as a result of the elevation of the till water interface, this well, if needed, will be segregated such that the center of the sampling zones are spaced approximately every 30 feet to provide reliable horizontal delineation.

We envision that the segregation of the till water sampling zones will be accomplished using alternating sections of 2-inch diameter PVC well screen and blank PVC casing. The sampling sections will be segregated within the 2-inch diameter well using inert stop corks and the outside of the 2-inch diameter well (i.e., within the 4-inch diameter borehole) using a series of bentonite seals. The bentonite seals will be injected into the annular space, following the placement of the 2-inch diameter well. The bentonite seals will be pumped into the annular space through 5-foot screened sections of PVC sandwiched between 5-foot sections of blank PVC casing containing the inert stop corks. The result will be 15-foot long sampling sections isolated from each other by 15-foot long segregation sections. The bentonite will be fed to each segregation section using ridged or flexible piping contained within the 2-inch diameter PVC well.

After a recovery period of approximately 24 hours, the sampling sections within the intermediate pilot test well will be purged and sampled using a peristaltic pump and in-place dedicated polyethylene tubing. Field measurements of pH, temperature, specific conductivity, and dissolved oxygen will be collected using an in-line flow cell during purging. One till water sample will be collected from each 30-foot interval and will be analyzed for VOCs using CLP Method OLM04.2 at an off-site commercial laboratory.

D. Till Water Sampling (Deeper Pilot Test Well)

If either the shallow or intermediate pilot test wells (see Section III.B below) are successful, i.e. provide samples representative of till water conditions, a deeper horizontal well will be installed within the saturated zone for the pilot test. Till water samples from the deeper well will be collected at 30-foot intervals within the well screen. As the main section of this well will be horizontal (i.e., installed at a single elevation), the 30-foot intervals within the screen will not be isolated using grouting or other methods. The deeper

horizontal well will be purged and sampled using low flow sampling techniques similar to those used to purge and sample the on-site till water wells. The horizontal till water well will be purged and sampled using a PVC bladder pump and Teflon-lined tubing. The Teflon-lined tubing will be dedicated to each sampling interval.

Field measurements of pH, temperature, specific conductivity, and dissolved oxygen will be collected using an in-line flow cell during purging. The till water samples will be collected only after these field parameters have stabilized. One till water sample will be collected from each 30-foot interval and will be analyzed for VOCs using CLP Method OLM04.2 at an off-site commercial laboratory.

III. SCOPE OF WORK

A. Pre-Project Planning and Mobilization

ENVIRON will conduct an on-site pre-bid meeting for potential drilling subcontractors. Following the pre-bid meeting, ENVIRON will choose the subcontractors for the project based on their technical proposals, cost estimates and availability to complete the project.

To prevent damage to the existing SVE system, an Indiana-certified surveyor will locate and mark the existing SVE trenches and underground piping. In addition, the ground surface elevation along each proposed horizontal well transect will be surveyed at several locations to provide benchmarks for determining the optimal drilling depth for the horizontal wells. ENVIRON personnel will return to the site to mark the horizontal well locations and to identify any obstructions or limits that may affect the horizontal well installation process.

B. Pilot Test

A multi-stage pilot test will be conducted to determine the feasibility of the vapor tracing investigation. The first portion of the pilot test will consist of the installation and vapor sampling of a shallower horizontal well immediately above the deeper horizontal well. This well will be installed and sampled according to the procedures outlined in Section II.B above.

If the vapor samples are not representative, a second horizontal well (intermediate well), capable of collecting segregated till water samples at 30-foot intervals, will be installed and sampled as discussed in Section II.C.

If either of the shallow or intermediate horizontal wells are successful, the second portion of the pilot test will consist of installing a horizontal well within the saturated interval of the till, mid-way between the till water interface and the base of the till unit. The horizontal till water well will be sampled at discrete 30-foot intervals across the on-site area according to Section II.D.

Following the completion of the pilot test and the receipt of the analytical results, a memorandum will be prepared summarizing the results of the pilot test and the Trustees' recommendations concerning the completion of the full-scale investigation.

C. Full-Scale Investigation

If implemented, the full-scale investigation will involve the installation of the proposed on-site horizontal wells (13 wells) and the proposed off-site well between the remedial boundary and Unnamed Ditch. As shown on Figure 1, ten of the horizontal wells will have a total screen length of approximately 250 feet. The remaining four on-site wells will have a total screen length of approximately 175 feet. The off-site horizontal well will have a total screen length of approximately 440 feet. Each of the 14 wells will be installed and sampled according to the procedures outlined in Section II.B above.

D. Reporting

If implemented, a final report will be prepared following the completion of the full-scale investigation. The final report will contain the results of the pilot test and full-scale investigation, as well as recommendations for additional remedial activities for the till water, as appropriate.

IV. SCHEDULE

Completion of the pre-construction planning and mobilization task is expected to take approximately 2 to 3 weeks following U.S. EPA's concurrence with this approach. The pilot test is expected to take approximately one to two weeks, after which a decision will be made in concert with U.S. EPA and IDEM whether to proceed with the full-scale investigation, to modify the investigation, or to terminate the investigation. If implemented as proposed, the installation and sampling of the remaining horizontal wells is expected to take approximately 4 weeks, with a draft report submitted to the Agency approximately 2 weeks thereafter.

Please do not hesitate to call us if you have any questions or require additional information concerning this work plan.

Sincerely,

ENVIRON International Corporation

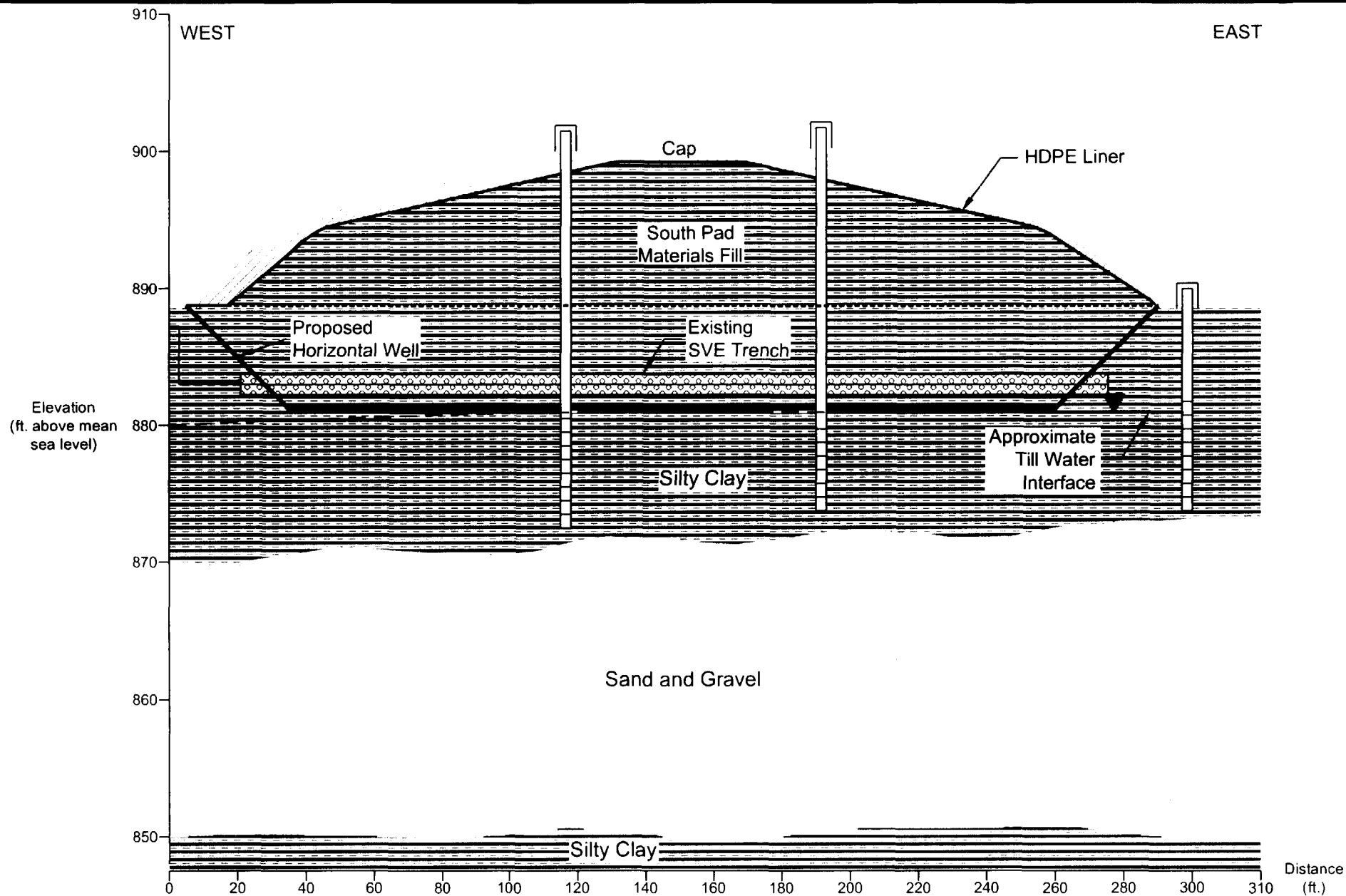


F. Ross Jones, P.G.
Manager

FRJ:als

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cc: Mr. Michael Habeck – IDEM
Mr. Tim Harrison – CH2M Hill
Mr. Phil Smith – CH2M Hill
Norman Bernstein, Esq. – Trustee
Roy Ball – Trustee



ENVIRON

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Typical Schematic East-West Cross Section
ECC Site
Zionsville, Indiana

Figure

2

Drafter: APR

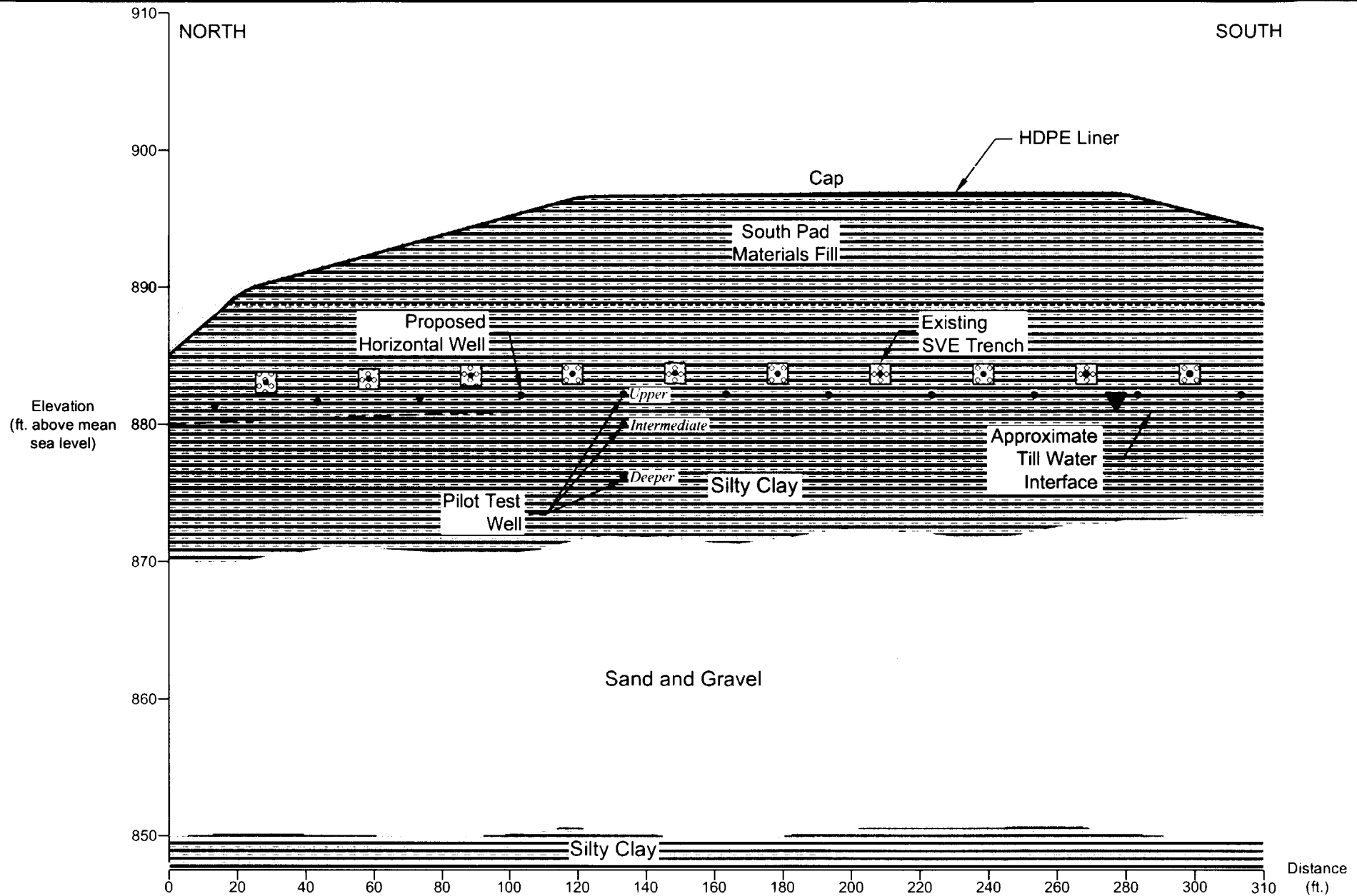
Date: 9/28/01

Contract Number:

21-6585

Approved:

Revised:



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740 Waukegan Road, Suite 401, Deerfield, IL 60015

Typical Schematic North-South Cross Section
ECC Site
Zionsville, Indiana

Figure
3

Drafter: APR

Date: 10/1/01

Contract Number:

21-6585

Approved:

Revised:

